2.5 Waste Management and Chemical Inventories

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2.5.1 Waste Management

Waste produced from Hanford Site cleanup operations is classified as either radioactive, nonradioactive, mixed, or toxic. Radioactive waste is categorized as transuranic, high-level, or low-level. Mixed waste has both radioactive and hazardous nonradioactive substances. Hazardous waste contains either dangerous waste or extremely hazardous waste or both, as defined in WAC 173-303. Hanford's hazardous wastes are managed in accordance with WAC 173-303.

Radioactive and mixed wastes are handled in several ways. High-level waste is stored in single- and double-shell tanks. Low-level waste is stored in double-shell tanks or on storage pads or is buried. The method used to manage low-level waste depends on its source, composition, and concentration. Transuranic waste is stored in vaults or on underground and aboveground storage pads from which it can be retrieved.

Approximately 200 Hanford Site facilities have the capacity to generate dangerous and toxic waste. An annual report lists the dangerous wastes and extremely hazardous wastes generated, treated, stored, and disposed of onsite and offsite (DOE/RL-98-08). Dangerous wastes are treated, stored, and prepared for disposal at several onsite facilities. Also, dangerous wastes generated on the site are also shipped offsite for disposal, destruction, or recycling.

Historically, nondangerous wastes generated on the Hanford Site were buried in the Solid Waste Landfill near the 200 Areas. Beginning in December 1995, nondangerous wastes were disposed of at the city of Richland's municipal landfill located at the southern edge of the Hanford Site boundary. Since 1996, medical and nonregulated drummed wastes have been shipped to Waste Management of Kennewick; asbestos has been shipped to Basin Disposal, Inc. in Pasco and to the Environmental Restoration Disposal Facility near the 200-West Area.

Nondangerous wastes originate at a number of areas across the site. Examples of these wastes are construction debris, office trash, cafeteria waste, and packaging materials. Other materials and items classified as waste are solidified filter backwash and sludge from the treatment of river water, failed and broken equipment and tools, air filters, uncontaminated used gloves and other clothing, and certain chemical precipitates such as oxalates. Ash generated at powerhouses in the 200 Areas is buried in designated sites near those powerhouses. Demolition wastes from decommissioning projects in the 100 Areas are buried in situ or in designated sites in the 100 Areas.

An annual report documents the quantities and types of solid wastes generated onsite, received from offsite, shipped offsite, and disposed of at the Hanford Site (HNF-EP-0125-10). Solid waste program activities are regulated by the Resource Conservation and Recovery Act and Toxic Substances Control Act, discussed in Section 2.2, "Compliance Status." Solid waste quantities generated onsite, received from offsite, shipped offsite, and disposed of at the Hanford Site from 1992 through 1997 are shown in Tables 2.5.1 through 2.5.3. Table 2.5.4 provides a detailed summary of the radioactive solid wastes stored or disposed of in 1997.

The quantities of liquid wastes generated in 1997 and stored in underground storage tanks are included in the annual dangerous waste report (DOE/RL-98-08). Table 2.5.5 is a summary of the liquid wastes generated from 1992 through 1997 stored in underground tanks.

Table 2.5.1. Quantities of Solid Wastes[a] Generated on the Hanford Site, kg (lb)

Waste Category	1992	1993	1994	1995	1996	1997
Mixed	48,600 (107,163)	150,000 (330,750)	568,000 (1,252,440)	132,000 (291,060)	199,000 (438,795)	442,000 (974,610)
Radioactive	683,000 (1,506,015)	1,120,000 (2,469,600)	1,390,000 (3,064,950)	1,890,000 (4,167,450)	3,870,000 (8,533,350)	6,590,000 (14,530,950)

(a) Solid waste includes containerized liquid waste.

Table 2.5.2. Quantities of Solid Wastes[a] Received from Offsite, kg (lb)

Waste Category	1992	1993	1994	1995	1996	1997
Mixed	40,900 (90,185)	208,000 (458,640)	96,000 (211,680)	52,800 (116,424)	2,070 (4,564)	3,560 (7,850)
Radioactive	1,010,000 (2,227,050)	1,590,000 (3,505,950)	1,360,000 (2,998,800)	1,310,000 (2,888,550)	1,670,000 (3,682,350)	1,430,000 (3,153,150)

(a) Solid waste includes containerized liquid waste. Solid waste quantities do not include United States Navy submarine reactor compartments.

Table 2.5.3. Quantities of Hazardous Wastes[a] Shipped Offsite, kg (lb)

Waste Category	1992	1993	1994	1995	1996	1997
Containerized	181,000 (399,105)	124,000 (273,420)	267,000 (588,735)	224,000 (493,920)	590,000 (1,300,950)	110,000 (242,550)
Bulk Solids	433,000 (954,765)	250,000 (551,250)	2,870,000 (6,328,350)	478,000 (1,053,990)	0	335,000 (738,675)
Bulk Liquids	11,100 (24,476)	94,000 (207,270)	249,000 (549,045)	130,000 (286,650)	98,800 (217,854)	5,025,000 (11,080,125)
Total	625,000[b] (1,378,125)	468,000[c] (1,031,940)	3,390,000[d] (7,474,950)	832,000 (1,834,560)	689,000 (1,519,245)	5,470,000 (12,061,350)

(a) Does not include Toxic Substances Control Act wastes.
(b) Includes 419,000 kg (923,895 lb) from demolition of 2727-S Building, 200-West Area.
(c) Includes 250,000 kg (551,250 lb) from demolition of 190-B Building, 100-B Area.
(d) Includes 2,660,000 kg (5,865,300 lb) from North Slope cleanup and 161,000 kg (355,005 lb) from carbon tetrachloride soil extraction near the Plutonium Finishing Plant, 200-West Area.

Table 2.5.4. Radioactive Solid Wastes Stored or Disposed of on the Hanford Site, 1997

Constituent	Quantity, Ci	
	Low Level[a]	Transuranic[b]
Tritium	47,000	41
Carbon-14	20	0.21
Manganese-54	1.5	58
Iron-59	0.00062	0
Cobalt-60	21,000	41
Nickel-63	14,000	0
Strontium-90	1,100	3,900,000[c]
Yttrium-90	1,100	3,900,000[c]
Technetium-99	0.36	1.0
Cesium-137	1,500	5,000,000[c]
Barium-137m	1,400	4,800,000[c]
Thorium-232	0.026	0.000093
Uranium-233	0.053	0
Uranium-234	8.0	0.0037
Uranium-235	0.14	0.0026
Uranium-236	0.0092	0.00022
Uranium-238	9.5	0.0023
Neptunium-237	0.01	0.000046
Plutonium-238	0.87	91
Plutonium-239	5.1	300
Plutonium-240	1.8	120
Plutonium-241	120	8,500
Plutonium-242	0.0011	0.071
Americium-241	2.0	31
Americium-243	0.014	2.5
Curium-244	0.48	2.5

(a) The quantities of low-level wastes include both radioactive and mixed waste totals.
(b) Transuranic waste quantities (>100 nCi/gm) also include both radioactive and mixed transuranic waste.
(c) Glass logs (vitrified waste) from Germany.

Table 2.5.5. Quantities of Bulk Liquid Wastes[a] Generated and Stored on the Hanford Site, L (gal)

1992	1993	1994	1995	1996	1997
12,600,000	22,200,000	10,700,000	18,200,000	2,420,000	11,300,000
(3,328,920)	(5,865,240)	(2,826,940)	(4,808,440)	(639,364)	(2,985,460)

(a) Bulk liquid waste is defined as liquid waste sent to double-shell underground storage tanks. This does not include containerized waste (e.g., barreled) included in the solid waste category.

Table 2.5.6. Average Balance of Ten Chemicals Stored in Greatest Quantity on the Hanford Site, 1997

Hazardous Chemical	Average Quantity, kg (lb)
Coal	7,500,000 (16,537,500)
Mineral oil	1,800,000 (3,969,000)
Sodium	1,100,000 (2,425,500)
Diesel fuel (Grades 1 and 2)	590,000 (1,300,950)
Crystalline silica (quartz, cristobalite, tridymite)	430,000 (948,150)
No. 6 fuel oil	390,000 (859,950)
Bentonite	360,000 (793,800)
Ethylene glycol	250,000 (551,250)
Argon	95,000 (209,475)
Carbon	94,000 (207,270)

2.5.2 Chemical Inventories

Types, quantities, and locations of hazardous chemicals are tracked through compliance activities associated with the Emergency Planning and Community Right-To-Know Act (see Section 2.2, “Compliance Status”). The 1997 Tier Two Emergency and Hazardous Chemical Inventory (DOE/RL-98-17) was issued in February 1998 in compliance with Section 312 of the Act. Table 2.5.6 summarizes the information reported, listing the 10 chemicals stored in greatest quantity on the Hanford Site in 1997.